

DIALOG(R)File 351:Derwent WPI  
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JC17 Rec'd PCT/PTO 08 JUN 2005

008998208 \*\*Image available\*\*  
WPI Acc No: 1992-125481/199216  
XRPX Acc No: N92-093826

Chain link conveyor - has interacting member in shape of longitudinally  
extending profile in curve sections with downward extending parts  
Patent Assignee: MASKFAB BAELTIX A/S (BAEL-N); MASKINFABRIKKEN BAELTIX AS  
(BAEL-N)

Inventor: DAMKJAER P E

Number of Countries: 009 Number of Patents: 005

Basic Patent:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
EP 480863	A	19920415	EP 91610081	A	19910926	199216 B

Priority Applications (No Type Date): US 90590924 A 19901001

Cited Patents: GB 1256590; US 3442368; US 3512627; US 4241822; US 4958726;  
EP 4809110; GB 2037690

Designated States (Regional): AT; DE; ES; FR; GB; IT; NL; SE

Abstract (Basic): EP 480863 A

The curve section (1,1') comprises at least two parallel sliding surfaces (2) placed at a distance from each other, and between which is provided a longitudinally extending slot or recess (3) for the downwards-protruding parts (5) of the chain links. At least one profile (6) is provided in the slot or recess (3) between the sliding surfaces, which profile extends parallel to the sliding surfaces and is designed to interact with the downwards-protruding parts (5) of the chain links.

The profile (6) has a preferably through-going projection (14) on the side facing outward in the curve section. A longitudinally extending slanting sliding surface (12) is provided on or at the projection (14).

USE/ADVANTAGE - For automatically holding down a chain in the correct plane during the passage of curves, and by which principle the curve sections and the chain links are designed in such a way that the chain will automatically disengage when it is stopped, after which the chain may immediately be lifted free of the track or the curve section, for example for cleaning.

Dwg.1/8

Title Terms: CHAIN; LINK; CONVEYOR; INTERACT; MEMBER; SHAPE; LONGITUDE;  
EXTEND; PROFILE; CURVE; SECTION; DOWN; EXTEND; PART

Derwent Class: Q35

International Patent Class (Main): B65G-015/02

International Patent Class (Additional): B65G-017/06

File Segment: EngPI

DIALOG(R)File 348:EUROPEAN PATENTS

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00495854

Chain link conveyor.

Plattenbandforderer.

Transporteur a palettes.

PATENT ASSIGNEE:

MASKINFABRIKKEN BAEITIX A/S, (1415470), Englandsvej 12, DK-7100 Vejle,

(DK), (applicant designated states: AT;DE;ES;FR;GB;IT;NL;SE)

INVENTOR:

Damkjaer, Poul Erik, Markvangen 20, DK-7100 Vejle, (DK)

LEGAL REPRESENTATIVE:

Lund, Preben et al (61071), Larsen &amp; Birkeholm A/S Skagensgade 64 P.O.

Box 200, DK-2630 Taastrup, (DK)

PATENT (CC, No, Kind, Date): EP 480863 A1 920415 (Basic)

EP 480863 B1 950510

APPLICATION (CC, No, Date): EP 91610081 910926;

PRIORITY (CC, No, Date): US 590924 901001

DESIGNATED STATES: AT; DE; ES; FR; GB; IT; NL; SE

INTERNATIONAL PATENT CLASS: B65G-017/06; B65G-015/02;

CITED PATENTS (EP A): US 3442368 A; US 3442368 A; GB 1256590 A; US 4958726

A; US 3512627 A; US 4241822 A

ABSTRACT EP 480863 A1

A chain link conveyor with chain links (4) and a curve section (1) has interacting means in the shape of a longitudinally extending profile (6) in the curve section (1), and downwards-extending parts (5) on the chain links, so that interacting slanting surfaces (12, 13) are provided, which permit the chain to be automatically held down in the correct plane during the passage of curves, and in which the chain by means of a free passage (15) may be lifted free of the track as soon as the chain is stopped. (see image in original document)

ABSTRACT WORD COUNT: 98

LEGAL STATUS (Type, Pub Date, Kind, Text):

Application: 920415 A1 Published application (A1with Search Report  
;A2without Search Report)

Examination: 921209 A1 Date of filing of request for examination:  
921013

Examination: 940511 A1 Date of despatch of first examination report:  
940325

Grant: 950510 B1 Granted patent

Lapse: 960110 B1 Date of lapse of the European patent in a  
Contracting State: AT 950510

Lapse: 960124 B1 Date of lapse of the European patent in a  
Contracting State: AT 950510, SE 950810

Oppn None: 960501 B1 No opposition filed

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	809
CLAIMS B	(English)	EPAB95	666
CLAIMS B	(German)	EPAB95	591
CLAIMS B	(French)	EPAB95	767
SPEC A	(English)	EPABF1	2622
SPEC B	(English)	EPAB95	2525
Total word count - document A			3431
Total word count - document B			4549
Total word count - documents A + B			7980

## SPECIFICATION EP 480863 A1

The invention relates to a new conveyor system in which a usually endless conveyor chain is displaced along a track. The new conveyor system may also be employed in the construction of courses consisting of several parallel tracks.

It is well known in respect of chain link conveyors that the passage of horizontal curves may cause problems as the chain is apt to rise from the outermost sliding surface of the curve. This problem has for many years been redressed by means of side cams on the chain links, which side cams interact with the under side of the sliding surface. However, this solution implies several disadvantages. The construction enhances the friction; it is only possible to remove the chain for cleaning, from for example a curve section, by separating chain links to split up the chain and pulling the chain free of the curve section; moreover, chains of this type have an outspoken tendency to produce noise and pulsations when passing curves.

A newer method for solving the problem in connection with the passage of curves is the employment of curve sections with built-in magnets which hold down the chain links in the horizontal plane through the curves. Hereby the possibility is provided of lifting the chain free of the track, also in curves, but then a greatly enhanced friction is produced, and the curve sections become very expensive and heavy on account of the powerful magnets which have to be placed in the curve sections. Furthermore, the chain either has to be produced of a magnetizable material, or has to be provided with bits of magnetizable material embedded in each individual chain link. It is therefore not possible to employ chain links consisting purely of plastic for magnet curves. As a minimum steel pins have to be employed for the coupling together of the chain links for a magnet curve to be able to hold down the chain links.

The object of the invention is to present a completely new principle for automatically holding down a chain in the correct plane during the passage of curves, and by which principle the curve sections and the chain links are designed in such a way that the chain will automatically disengage when it is stopped, after which the chain may immediately be lifted free of the track or the curve section, for example for cleaning.

This is achieved by designing a curve section according to the invention as presented and characterized in claim 1, and by designing the correspondent chain links as presented and characterized in claim 8. Since it is a question of a completely new principle for operating conveyor chains, so called flex chains, in curves, this new principle may be employed in connection with almost any type of chain, and in complete disregard of the way in which the chain is otherwise designed, i. e. regardless of whether the top surfaces of the chain links are smooth or provided with ribs or rollers, or whether they carry friction means. Furthermore, the new principle according to the invention may be used both in connection with chain links of plastic and links of steel.

By designing the curve sections and the chain links according to the invention as described in the dependent claims 2-7 and 9-11 it is achieved, on account of the slanting surfaces and the pull in the chain, that the chain is automatically held down in the correct horizontal level, and that the chain stays in the correct level even when the chain and the curve sections have been heavily abraded after a long time of operation. When the chain is stopped it may be lifted free of the track at any place in a curve, for example for cleaning. This also applies when a number of chains operate close to each other, for example in curves of 6-8 rows, in which case it is possible to lift the chains free of the course individually and completely independent of each other, as the slanting side surfaces will shift the chain a little sideways when the chain is lifted, and disengage it from the track.

By means of the new construction a very noiseless and pulsationless

operation is achieved, because the tight side of the chain will always be placed outside the centerline of the chain, and because the inner side of the downwards-extending legs or parts of the chain may be designed in such a way that it is completely out of touch with the curve section.

The invention also relates to a complete, fundamentally new transport system as presented and characterized in claim 12. The system may comprise single tracks or courses consisting of several parallel tracks, and both chain links and tracks may be produced of any known material, i.e. both steel and plastic, and corresponding to all the known materials of which transport systems with endless chains are made today.

Any chain link of the numerous types known may be designed with slanting sides at that side of the chain which is facing downwards during operation, so that the chain links may be used in connection with suitable tracks or sliding surfaces in order to obtain the above mentioned advantages. The invention therefore also generally relates to a chain link as presented and characterized in claim 13.

Based on the principles of the present invention a curve section may also be designed with discs or curve wheels as presented and characterized in claim 14, the result being even lower friction than with conventional curve sections, especially in curves of 90(degree) or more. The passing of the curves moreover becomes even more noiseless than with conventional curve sections. The possibilities of lifting the chain free of the track, for example for cleaning, are not limited.

By designing the curve section with discs as presented and characterized in claim 15, a more simple, solid, wear-resisting and dependable construction is achieved at a competitive price.

Tests of the chain link conveyor according to the invention have shown that the friction between the chain and the track is considerably lower than with the known chains. Consequently, the energy consumption may be considerably reduced.

The invention will be explained in further detail in the following with reference to the drawing which shows a preferred embodiment of the invention, and in which

fig. 1 is a cross section of a curve section of a chain link conveyor according to the invention, along the plane II - II of fig. 2,

fig. 2 is a top view of a part of a conveyor system according to the invention,

fig. 3A and 3B show an example of a plastic chain link according to the invention,

fig. 4A and 4B show an example of a steel chain link according to the invention,

fig. 5 shows an example of a chain link conveyor according to a second embodiment of the invention.

fig. 6 is a curve section with discs but without a conveyor chain,

fig. 7 is a cross section along VII-VII in fig. 6 with a conveyor chain, and

fig. 8 is a cross section along VIII-VIII in fig. 6 with a conveyor chain.

In fig. 1, which is a delineation of the principle of a chain link conveyor according to the invention, a segment of such a conveyor is shown comprising a curve section 1 and a conveyor chain 4 comprising a number of uniform chain links which are interconnected in a commonly known way.

It will be obvious to an expert in the field that a number of such tracks or conveyors may be placed parallel to and close to each other, so that a wider conveyor is formed if needed. Each chain 4 is driven by an individual driving wheel (not shown), and the endless chain is returned by means of return grooves 10 at the bottom of the side pieces 9 of the track. The return part may possibly, if there is a need or demand for complete cleaning of the conveyor chain, be designed as shown in the

bottom part of fig. 5, in which both the upper surface and the bottom side of the chain are accessible to cleaning.

The chain links 4 in fig. 1 may for example be interconnected by means of a link pin 7 of steel or plastic, which link pin is only sketchily indicated as such connections are generally known. The chain links are supported on sliding surfaces 2 at each side, which sliding surfaces could for example be the top surface of the track or the curve section 1. A downwards-protruding part 5 is placed below each chain link at each side, which parts extend into a lengthwise extending slot or recess 3 between the sliding surfaces 2. The track proper, which in fig. 1 is the curve section 1, furthermore comprises the two side pieces 9 which are connected by a bridge piece 8. The track or the curve section 1 is often produced integrally out of plastic, for example a low density polyethylene, by molding or machine finishing, but it may of course be produced of any suitable material with sufficient characteristics in way of strength etc. The sliding surfaces 2 may directly be the upper surfaces of the side pieces 9, but may also be mounted wear or sliding strips.

A longitudinally extending profile slide 6 is placed between the the sliding surfaces 2 and parallel to the sliding surfaces 2 and the side pieces 9, which profile 6 may be integral with the bridge piece 8 and arranged to interact with one of the downwards-protruding parts 5 at one of the sides of the chain link, as shown in the drawing. The interaction may be provided by the downwards-protruding parts 5 of the chain links 4 having a slanted downwards and inward towards the central plane extending surface 13 which corresponds to a slanting surface 12 which extends in the same direction on the longitudinally extending profile 6. Projections 17, 14 are hereby provided on the chain links 4 and the profile 6, respectively. The surfaces 12, 13 are preferably placed further outward in the curve than the central plane of the conveyor and as shown in the drawing.

When the chain is pulled in the direction of the arrow 18, a force 19 directed towards the center of the curve will be produced during the passage through a curve, as shown in figs. 1 or 2, which force will prevent the chain link from lifting from the outer sliding surface 2 of the curve, because the surfaces 12, 13 will prevent this.

A free passage 15 is provided at the outermost side and between the downwards-protruding part 5 of the chain and the outermost side piece 9 of the curve, which passage 15 is wide enough to permit the chain 4 to be lifted off the curve section 1 as soon as the chain is stopped. The slanting surfaces 12, 13 help when the chain is to be lifted, as a vertical pull on the chain will cause the chain links to be displaced outwardly and the free passage 15 to be diminished. The chain may now be freely lifted from the curve section and freely be put back in place again. As soon as the driving wheel is again started and a pull 18 is again applied to the chain, this will automatically be pulled back in place as shown in fig. 1.

The free space 16 in the opposite side prevents friction between the chain links and the side piece 9 at the inside of the curve. In case the chain links are under great load the free space 16 may be omitted, so that the load on the surfaces 12, 13 is reduced, as some of the friction and thereby some of the load is taken over by other surfaces. The life of both the chain and the curve section is hereby considerably prolonged.

Fig. 2 shows the same conveyor as fig. 1, but seen from above, and in the shape of a single track which extends from a straight track 11 to another straight track 11(min) via a 90(degree) curve section 1. The curve section 1 is provided with a longitudinally extending profile 6 which profile is not necessary in the straight tracks 11 and 11(min). If the curve section 1 is to be cleaned, for example to remove the remnants of a broken bottle or the like, the conveyor chain 4 is simply stopped,

the chain is lifted off the track where the need is, the track is cleaned, and the chain thereafter simply put back in place again, whereafter the conveyor may again be started. Such a cleaning operation may be executed very quickly because the chain does not have to be opened.

The embodiment of the profile 6 and the downwards-protruding parts 5 as shown in figs. 1 and 2, is only an example of how the curve sections and the chain links may be designed according to the invention. It will be obvious to an expert in the field that the same effect as explained above may be obtained by many other embodiments of the chain links and the curve sections, provided that such embodiments have parts which in the described way may interact with each other and automatically keep the chain down in the correct plane during the passage of the curves.

Figs. 3A and 3B show an example of a plastic chain link according to the invention, and figs. 4A and 4B show an example of a steel chain link according to the invention. Both chain links are shown with a smooth surface, but may of course be designed in any known way with ribs, rollers, friction means or the like. If only the chain links are provided with downwards-protruding parts or cams which have slanting and inward sloping sides or surfaces 13, it will be possible to use them with tracks or courses of the above mentioned kind, so that the advantages described may be obtained.

A similar chain link conveyor is shown in fig. 5, in which the curve section 1(min) comprises a downwards-extending inverted T-shaped part 20, on which the chain may be guided freely suspended for the return run to facilitate cleaning, sterilizing, lubrication, inspection etc. Any chain, for example of the kind shown in figs. 3 or 4, may be guided for return in this simple way, so that the desired technical advantages in respect of cleaning are obtained.

Figs. 6-8 show a curve section 25 between two conveyors extending straight ahead 11(min)(min). However, the conveyor chains 4 are only shown in figs. 7 and 8. The curve section 25 as shown is a section of 90(degree) but may of course have any angle between 0(degree) and 180(degree).

The curve section comprises two discs 26, 27 which are both mounted rotatably on a column 28 of steel or the like. The discs 26, 27 which are preferably made of synthetic material, are mounted on the column 28 by means of ball bearings 29 or the like, which at the top are covered by a cover 35. On the column is fixedly mounted a carrying means or a retainer 30 between the discs, which retainer 30 retains a section piece 1(min)(min) for the chain 4 to travel forward (the top one) and means for the chain to return (the bottom one), since the travelling forward is effected by the top disc 26 and the returning by the bottom disc 27. The parts are held together by means of bolts 33 and spacer blocks 32. The curve section 1(min)(min) has a profile 6(min) having a cross-sectional profile as explained before and is, as explained before, in engagement with the downwards-protruding parts of the conveyor chain 4, which parts have a slanting sliding surface 13. The profile 6(min) is by means of bridge parts 31 or the like cast integral with a side piece 9(min). The top surface 2(min) of the side piece 9(min) is or is provided with a sliding surface for the one side of the chain 4, in that the other side abuts the top surface 34 of the rotatable disc 26.

This curve section with discs makes it possible, like with the curve section as explained and shown in figs. 1 and 2, to lift the chain 4 free of the track anywhere, for example for cleaning, inspection, repair etc., without separating the chain. When restarting, the chain 4 is automatically drawn into place for engagement with the profile 6(min).

SPECIFICATION EP 480863 B1  
Field of the invention

The invention relates to a new conveyor system in which a usually endless conveyor chain is displaced along a track. The new conveyor system may also be employed in the construction of courses consisting of several parallel tracks.

#### Background of the invention

It is well known in respect of chain link conveyors that the passage of horizontal curves may cause problems as the chain is apt to rise from the outermost sliding surface of the curve. This problem has for many years been redressed by means of side cams on the chain links, which side cams interact with the underside of the sliding surface. However, this solution implies several disadvantages. The construction enhances the friction; it is only possible to remove the chain for cleaning, from for example a curve section, by separating chain links to split up the chain and pulling the chain free of the curve section; moreover, chains of this type have an outspoken tendency to produce noise and pulsations when passing curves. This technology is known from US-A-3,442,368, US-A-4,958,726 and US-A-3,512,627.

A newer method for solving the problem in connection with the passage of curves is the employment of curve sections with built-in magnets which hold down the chain links in the horizontal plane through the curves. Hereby the possibility is provided of lifting the chain free of the track, also in curves, but then a greatly enhanced friction is produced, and the curve sections become very expensive and heavy due to the powerful magnets which have to be placed in the curve sections. Furthermore, the chain either has to be produced of a magnetizable material, or has to be provided with bits of magnetizable material embedded in each individual chain link. It is therefore not possible to employ chain links consisting purely of plastic for magnet curves. As a minimum steel pins have to be employed for the coupling together of the chain links for a magnet curve to be able to hold down the chain links. Magnet curve sections are known from GB-A-2,037,690.

#### Summary of the invention

The object of the invention is to present a completely new principle for automatically holding down a chain in the correct plane during the passage of curves, and by which principle the curve sections and the chain links are designed in such a way that the chain will automatically disengage when it is stopped, after which the chain may immediately be lifted free of the track or the curve section, for example for cleaning.

This is achieved by designing a chain link conveyor according to the invention as presented and characterized in claim 1. The preamble of claim 1 is based on US-A-3 442 368. Since it is a question of a completely new principle for operating conveyor chains, so called flex chains, in curves, this new principle may be employed in connection with almost any type of chain, and in complete disregard of the way in which the chain is otherwise designed, i. e. regardless of whether the top surfaces of the chain links are smooth or provided with ribs or rollers, or whether they carry friction means. Furthermore, the new principle according to the invention may be used both in connection with chain links of plastic and links of steel.

By designing the chain link conveyor according to the invention as described in the dependent claims 2-10 it is achieved, on account of the slanting surfaces and the pull in the chain, that the chain is automatically held down in the correct horizontal level, and that the chain stays in the correct level even when the chain and the curve sections have been heavily abraded after a long time of operation. When the chain is stopped it may be lifted free of the track at any place in a curve, for example for cleaning. This also applies when a number of chains operate close to each other, for example in curves of 6-8 rows, in which case it is possible to lift the chains free of the course individually and completely independent of each other, as the slanting

side surfaces will shift the chain a little sideways when the chain is lifted, and disengage it from the track.

By means of the new construction a very noiseless and pulsationless operation is achieved, because the tight side of the chain will always be placed outside the centerline of the chain, and because the inner side of the downwards-extending legs or parts of the chain may be designed in such a way that it is completely out of touch with the curve section.

Based on the principles of the present invention a chain link conveyor with a curve section may also be designed with discs or curve wheels as presented and characterized in claim 11, the result being even lower friction than with conventional curve sections, especially in curves of 90(degree) or more. The passing of the curves moreover becomes even more noiseless than with conventional curve sections. The possibilities of lifting the chain free of the track, for example for cleaning, are not limited.

By designing the curve section in the conveyor with discs as presented and characterized in claim 12, a more simple, solid, wear-resisting and dependable construction is achieved at a competitive price.

Tests of the chain link conveyor according to the invention have shown that the friction between the chain and the track is considerably lower than with the known chains. Consequently, the energy consumption may be considerably reduced.

#### Brief description of the drawings

The invention will be explained in further detail in the following with reference to the drawing which shows a preferred embodiment of the invention, and in which

fig. 1 is a cross section of a curve section of a chain link conveyor according to the invention, along the plane II - II of fig. 2,

fig. 2 is a top view of a part of a conveyor system according to the invention,

fig. 3A and 3B show an example of a plastic chain link according to the invention,

fig. 4A and 4B show an example of a steel chain link according to the invention,

fig. 5 shows an example of a chain link conveyor according to a second embodiment of the invention.

fig. 6 is a curve section with discs but without a conveyor chain,

fig. 7 is a cross section along VII-VII in fig. 6 with a conveyor chain, and

fig. 8 is a cross section along VIII-VIII in fig. 6 with a conveyor chain.

#### Detailed description of the embodiments

In fig. 1, which is a delineation of the principle of a chain link conveyor according to the invention, a segment of such a conveyor is shown comprising a curve section 1 and a conveyor chain 4 comprising a number of uniform chain links which are interconnected in a commonly known way.

It will be obvious to an expert in the field that a number of such tracks or conveyors may be placed parallel to and close to each other, so that a wider conveyor is formed if needed. Each chain 4 is driven by an individual driving wheel (not shown), and the endless chain is returned by means of return grooves 10 at the bottom of the side pieces 9 of the track. The return part may possibly, if there is a need or demand for complete cleaning of the conveyor chain, be designed as shown in the bottom part of fig. 5, in which both the upper surface and the bottom side of the chain are accessible to cleaning.

The chain links 4 in fig. 1 may for example be interconnected by means of a link pin 7 of steel or plastic, which link pin is only sketchily



indicated as such connections are generally known. The chain links are supported on sliding surfaces 2 at each side, which sliding surfaces could for example be the top surface of the track or the curve section 1. A downwards-protruding part 5 is placed below each chain link at each side, which parts extend into a lengthwise extending slot or recess 3 between the sliding surfaces 2. The track proper, which in fig. 1 is the curve section 1, furthermore comprises the two side pieces 9 which are connected by a bridge piece 8. The track or the curve section 1 is often produced integrally out of plastic, for example a low density polyethylene, by molding or machine finishing, but it may of course be produced of any suitable material with sufficient characteristics in way of strength etc. The sliding surfaces 2 may directly be the upper surfaces of the side pieces 9, but may also be mounted wear or sliding strips.

A longitudinally extending profile slide 6 is placed between the the sliding surfaces 2 and parallel to the sliding surfaces 2 and the side pieces 9, which profile 6 may be integral with the bridge piece 8 and arranged to interact with one of the downwards-protruding parts 5 at one of the sides of the chain link, as shown in the drawing. The interaction may be provided by the downwards-protruding parts 5 of the chain links 4 having a slanted downwards and inward towards the central plane extending surface 13 which corresponds to a slanting surface 12 which extends in the same direction on the longitudinally extending profile 6. Projections 17, 14 are hereby provided on the chain links 4 and the profile 6, respectively. The surfaces 12, 13 are preferably placed further outward in the curve than the central plane of the conveyor and as shown in the drawing.

When the chain is pulled in the direction of the arrow 18, a force 19 directed towards the center of the curve will be produced during the passage through a curve, as shown in figs. 1 or 2, which force will prevent the chain link from lifting from the outer sliding surface 2 of the curve, because the surfaces 12, 13 will prevent this.

A free passage 15 is provided at the outermost side and between the downwards-protruding part 5 of the chain and the outermost side piece 9 of the curve, which passage 15 is wide enough to permit the chain 4 to be lifted off the curve section 1 as soon as the chain is stopped. The slanting surfaces 12, 13 help when the chain is to be lifted, as a vertical pull on the chain will cause the chain links to be displaced outwardly and the free passage 15 to be diminished. The chain may now be freely lifted from the curve section and freely be put back in place again. As soon as the driving wheel is again started and a pull 18 is again applied to the chain, this will automatically be pulled back in place as shown in fig. 1.

The free space 16 in the opposite side prevents friction between the chain links and the side piece 9 at the inside of the curve. In case the chain links are under great load the free space 16 may be omitted, so that the load on the surfaces 12, 13 is reduced, as some of the friction and thereby some of the load is taken over by other surfaces. The life of both the chain and the curve section is hereby considerably prolonged.

Fig. 2 shows the same conveyor as fig. 1, but seen from above, and in the shape of a single track which extends from a straight track 11 to another straight track 11' via a 90(degree) curve section 1. The curve section 1 is provided with a longitudinally extending profile 6 which profile is not necessary in the straight tracks 11 and 11'. If the curve section 1 is to be cleaned, for example to remove the remnants of a broken bottle or the like, the conveyor chain 4 is simply stopped, the chain is lifted off the track where the need is, the track is cleaned, and the chain thereafter simply put back in place again, whereafter the conveyor may again be started. Such a cleaning operation may be executed very quickly because the chain does not have to be opened.

The embodiment of the profile 6 and the downwards-protruding parts 5 as shown in figs. 1 and 2, is only an example of how the curve sections and the chain links may be designed according to the invention. It will be obvious to an expert in the field that the same effect as explained above may be obtained by many other embodiments of the chain links and the curve sections, provided that such embodiments have parts which in the described way may interact with each other and automatically keep the chain down in the correct plane during the passage of the curves.

Figs. 3A and 3B show an example of a plastic chain link according to the invention, and figs. 4A and 4B show an example of a steel chain link according to the invention. Both chain links are shown with a smooth surface, but may of course be designed in any known way with ribs, rollers, friction means or the like. If only the chain links are provided with downwards-protruding parts or cams which have slanting and inward sloping sides or surfaces 13, it will be possible to use them with tracks or courses of the above mentioned kind, so that the advantages described may be obtained.

A similar chain link conveyor is shown in fig. 5, in which the curve section 1' comprises a downwards-extending inverted T-shaped part 20, on which the chain may be guided freely suspended for the return run to facilitate cleaning, sterilizing, lubrication, inspection etc. Any chain, for example of the kind shown in figs. 3 or 4, may be guided for return in this simple way, so that the desired technical advantages in respect of cleaning are obtained.

Figs. 6-8 show a curve section 25 between two conveyors extending straight ahead 11''. However, the conveyor chains 4 are only shown in figs. 7 and 8. The curve section 25 as shown is a section of 90(degree) but may of course have any angle between 0(degree) and 180(degree).

The curve section comprises two discs 26, 27 which are both mounted rotatably on a column 28 of steel or the like. The discs 26, 27 which are preferably made of synthetic material, are mounted on the column 28 by means of ball bearings 29 or the like, which at the top are covered by a cover 35. On the column is fixedly mounted a carrying means or a retainer 30 between the discs, which retainer 30 retains a section piece 1'' for the chain 4 to travel forward (the top one) and means for the chain to return (the bottom one), since the travelling forward is effected by the top disc 26 and the returning by the bottom disc 27. The parts are held together by means of bolts 33 and spacer blocks 32. The curve section 1'' has a profile 6' having a cross-sectional profile as explained before and is, as explained before, in engagement with the downwards-protruding parts of the conveyor chain 4, which parts have a slanting sliding surface 13. The profile 6' is by means of bridge parts 31 or the like cast integral with a side piece 9'. The top surface 2' of the side piece 9' is or is provided with a sliding surface for the one side of the chain 4, in that the other side abuts the top surface 34 of the rotatable disc 26.

This curve section with discs makes it possible, like with the curve section as explained and shown in figs. 1 and 2, to lift the chain 4 free of the track anywhere, for example for cleaning, inspection, repair etc., without separating the chain. When restarting, the chain 4 is automatically drawn into place for engagement with the profile 6'.

#### CLAIMS EP 480863 A1

1. A curve section (1, 1(min)) for a chain link conveyor (4), which curve section comprises at least two parallel sliding surfaces (2) placed at a distance from each other, and between which is provided a longitudinally extending slot or recess (3) for the downwards-protruding parts (5) of the chain links, characterized in that at least one profile (6) is provided in the slot or recess (3) between the sliding surfaces, which profile extends parallel to the

- sliding surfaces and is designed to interact with the downwards-protruding parts (5) of the chain links.
2. A curve section according to claim 1, characterized in that the profile (6) has a preferably through-going projection (14) on the side facing outward in the curve section.
  3. A curve section according to claim 2, characterized in that a longitudinally extending slanting sliding surface (12) is provided on or at the projection (14).
  4. A curve section according to claim 3, characterized in that the slanting surface (12) is substantially plane and is tilted inward towards the middle of the curve section.
  5. A curve section according to any of the claims 1-4, characterized in that it comprises parallel side pieces (9), on which the sliding surfaces (2) are provided, and a bridge piece (8) placed between and interconnecting the side pieces, which bridge piece comprises the profile (6); and wherein all members are cast integral out of the same material, preferably synthetic material.
  6. A curve section according to claim 5, characterized in that the side pieces (9) are extended downwards and comprise through-going parallel grooves or tracks (10) on the sides facing each other, which grooves are designed for the return run of the chain.
  7. A curve section according to claims 3 or 4, characterized in that the surface (12) is placed further outward in the curve section than the centerline of the chain.
  8. A chain link conveyor comprising a chain which may be displaced along a track consisting of two parallel sliding rails, which chain consists of chain links of which adjoining links are interconnected, and in which the links are supported on extending parts which slide on the sliding rails, and the connecting parts of the chain links are protruding downwards and are placed in an area between the sliding rails (9), characterized in that the downwards-protruding parts comprise projections (17) which are facing the central plane of the chain link and are designed to interact with a profile (6).
  9. A chain link conveyor according to claim 8, characterized in that the projections on the chain links comprise a slanted sliding surface (13).
  10. A chain link conveyor according to claim 9, characterized in that the slanting sliding surface is substantially plane and has a tilt downwards and inward towards the central plane of the chain link.
  11. A chain link conveyor according to claims 8-10, and in which the track comprises at least one curve section according to claims 1-7, characterized in that the area between the profile (6) and the outermost side piece (9) of the curve section provides a free passage (15) large enough to permit the chain links to be lifted free of the curve section.
  12. A conveyor system consisting of at least one chain which may be moved along at least one track consisting of parallel sliding rails, and in which the chain consists of uniform interconnected chain links, characterized in that the chain links and the track comprise interacting means so that the chain during operation automatically will be held down in the correct plane, even in curves, on account of the forward progressing movement of the chain and by means of downwards-protruding legs or side pieces with slanting surfaces.
  13. A chain link (4, 22, 23) for a conveyor, which chain link is designed so that a number of links may be interconnected to form a conveyor chain, characterized in that one side of the chain link has at least one projection or a cam (5) which has a slanted inward tilted side (13).
  14. A curve section (25) with discs (26, 27) which are both mounted rotatably on a column (28) comprises a retainer (30) which is fixedly

mounted between the discs on the column, which retainer (30) retains at least one curve piece (1(min)(min)) which is a part of the chain track along the periphery of one of the discs, characterized in that the curve piece (1(min)(min)) comprises a side piece (9(min)), the top surface (2(min)) of which is the outer sliding surface for the chain (4), where one of the discs is a supporting surface (33) for the chain (4) and where along the inside of the side piece there is a profile (6(min)) at a distance from the side piece (9(min)) and arranged to go into engagement with downwards-protruding inward facing parts (13) on the chain links.

15. Curve section according to claim 14, characterized in that the curve piece (1(min)(min)) comprising the profile (6(min)) and material placed hereinbetween, for example a bridge area (31), is cast integral in the same material, preferably synthetic material.

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1. A chain link conveyor with at least one curve section (1, 1') comprising a chain (4) displaced along a track including two parallel sliding rails (2, 2', 9), said chain including a plurality of interconnected adjoining chain links, each of said links including extending portions slidable along the sliding rails and downwardly projecting connecting parts (5) disposed in an area between the sliding rails (2, 2', 9), the downwardly projecting portions including oppositely disposed projection means (17), and one of said projection means (17) being engageable with a profile (6) at least in the curve section characterized in that said oppositely disposed projection means (17) are facing the central plane of the chain link and in that said profile (6) is provided between the sliding rails in such a manner so as to enable removal of the chain links from the rail by displacement of the chain links in a direction away from the profile (6).
2. A chain link conveyor according to claim 1, characterized in that the projection means (17) comprises a slanted sliding surface (13) adopted to engage with the profile (6).
3. A chain link conveyor according to claim 2, characterized in that the slanting sliding surface (13) is substantially planar and has a tilt downwards and inward towards the central plane of the chain link.
4. A chain link conveyor according to any one of the claims 1-3, characterized in that the area between the profile (6) and an outermost side piece (9) of the curve section (1, 1') is dimensioned so as to provide a free passage (15) large enough to permit the chain links to be lifted free of the curve section.
5. A chain link conveyor according to claim 1, characterized in that the profile (6) has a preferably through-going projection (14) on the side facing outward in the curve section (1, 1').
6. A chain link conveyor according to claim 5, characterized in that a longitudinally extending slanting sliding surface (12) is provided on or at the projection (14) of the profile (6).
7. A chain link conveyor according to claim 6, characterized in that the slanting surface (12) is substantially planar and is tilted inward towards the middle of the curve section (1, 1').
8. A chain link conveyor according to any of the claims 1-7, characterized in that the sliding rails (2, 2') are disposed on parallel side pieces (9) and that a bridge piece (8) is placed between and interconnecting the side pieces, which bridge piece comprises the profile (6); and wherein all members are integrally formed in one piece out of the same material, preferably synthetic material.
9. A chain link conveyor according to claim 8, characterized in that the side pieces (9) are extended downwards and comprise through-going

parallel grooves or tracks (10) on the sides facing each other for accomodating a return run of the chain links.

10. A chain link conveyor according to claim 7, characterized in that the surface (12) is placed further outward in the curve section than the centerline of the chain.
11. A chain link conveyor according to claim 1 and with a curve section (25) with discs (26, 27) which are both mounted rotatably on a column (28) comprises a retainer (30) which is fixedly mounted between the discs on the column, which retainer (30) retains at least one curve piece (1'') which is a part of the chain track along the periphery of one of the discs, characterized in that the curve piece (1'') comprises a side piece (9'), the top surface (2') of which is the outer sliding surface for the chain (4), where one of the discs is a supporting surface (33) for the chain (4) and where along the inside of the side piece there is a profile (6') at a distance from the side piece (9') and arranged to go into engagement with downwards-protruding inward facing parts (13) on the chain links.
12. A chain link conveyor according to claim 11, characterized in that the curve piece (1'') comprising the profile (6') and material placed hereinbetween, for example a bridge area (31), are integrally formed in one piece of the same material, preferably synthetic material.

#### CLAIMS EP 480863 B1

1. Kettengliedforderer mit wenigstens einem Kurvenabschnitt (1, 1'), der eine Kette (4) umfaßt, die auf einer Spur verschoben wird, die zwei parallele Gleitschienen (2, 2', 9) enthält, wobei die Kette eine Vielzahl miteinander verbundener aneinandergrenzender Kettenglieder enthält, wobei jedes der Glieder verlängerte Abschnitte enthält, die auf den Gleitschienen gleiten können, sowie nach unten vorstehende Verbindungsteile (5), die in einem Bereich zwischen den Gleitschienen (2, 2', 9) angeordnet sind, wobei die nach unten vorstehenden Abschnitte einander gegenüberliegend angeordnete Vorsprungseinrichtungen (17) aufweisen, und eine der Vorsprungseinrichtungen (17) wenigstens in dem Kurvenabschnitt mit einem Profil (6) in Eingriff kommen kann, dadurch gekennzeichnet, das die einander gegenüberliegend angeordneten Vorsprungseinrichtungen (17) der Mittelebene des Kettengliedes zugewandt sind, und dadurch, das das Profil (6) zwischen den Gleitschienen so angeordnet ist, das es die Entfernung der Kettenglieder aus der Schiene durch Verschiebung der Kettenglieder in einer Richtung von dem Profil (6) weg ermöglicht.
2. Kettengliedforderer nach Anspruch 1, dadurch gekennzeichnet, das die Vorsprungseinrichtung (17) eine geneigte Gleitfläche (13) umfaßt, die mit dem Profil (6) in Eingriff kommt.
3. Kettengliedforderer nach Anspruch 2, dadurch gekennzeichnet, das die geneigte Gleitfläche (13) im wesentlichen plan ist, und eine Neigung nach unten und nach innen in Richtung der Mittelebene des Kettengliedes aufweist.
4. Kettengliedforderer nach einem der Ansprüche 1-3, dadurch gekennzeichnet, das der Bereich zwischen dem Profil (6) und einem ausersten Seitenteil (9) des Kurvenabschnitts (1, 1') so bemessen ist, das er einen freien Durchlas (15) bildet, der gros genug ist, um das ungehinderte Abheben der Kettenglieder von dem Kurvenabschnitt zu ermöglichen.
5. Kettengliedforderer nach Anspruch 1, dadurch gekennzeichnet, das das Profil (6) einen vorzugsweise durchgehenden Vorsprung (14) an der in dem Kurvenabschnitt (1, 1') nach ausen gerichteten Seite hat.
6. Kettengliedforderer nach Anspruch 5, dadurch gekennzeichnet, das eine in Langsrichtung verlaufende geneigte Gleitfläche (12) auf oder an dem Vorsprung (14) des Profils (6) vorhanden ist.
7. Kettengliedforderer nach Anspruch 6, dadurch gekennzeichnet, das die

- geneigte Fläche (12) im wesentlichen plan ist und nach innen in Richtung der Mitte des Kurvenabschnitts (1, 1') geneigt ist.
8. Kettengliedforderer nach einem der Ansprüche 1-7, dadurch gekennzeichnet, das die Gleitschienen (2, 2') an parallelen Seitenteilen (9) angeordnet sind, und das ein Bruckenteil (8) zwischen den Seitenteilen angeordnet ist und sie miteinander verbindet, wobei das Bruckenteil das Profil (6) umfast; und wobei alle Teile aus einem Stuck aus dem gleichen Material, vorzugsweise Kunststoffmaterial, bestehen.
  9. Kettengliedforderer nach Anspruch 8, dadurch gekennzeichnet, das die Seitenteile (9) nach unten verlängert sind und durchgehende parallele Nuten bzw. Bahnen (10) an den einander zugewandten Seiten umfassen, die einen Ruckkehrstrang der Kettenglieder aufnehmen.
  10. Kettengliedforderer nach Anspruch 7, dadurch gekennzeichnet, das die Fläche (12) weiter ausen in dem Kurvenabschnitt als die Mittellinie der Kette angeordnet ist.
  11. Kettengliedforderer nach Anspruch 1 mit einem Kurvenabschnitt (25) mit Scheiben (26, 27), die beide drehbar an einer Saule (28) angebracht sind, die eine Halteeinrichtung (30) umfast, die fest zwischen den Scheiben an der Saule angebracht ist, wobei die Halteeinrichtung wenigstens ein Kurventeil (1'') halt, das ein Teil der Kettenbahn am Umfang einer der Scheiben ist, dadurch gekennzeichnet, das das Kurventeil (1'') ein Seitenteil (9') umfast, dessen Oberseite (2') die ausere Gleitfläche für die Kette (4) bildet, wobei eine der Scheiben eine Auflagefläche (33) für die Kette (4) bildet, und wobei entlang der Innenseite des Seitenteils ein Profil (6') in einem Abstand zu dem Seitenteil (9') vorhanden ist, das mit nach unten vorstehenden, nach innen gerichteten Teilen (13) an den Kettengliedern in Eingriff kommt.
  12. Kettengliedforderer nach Anspruch 11, dadurch gekennzeichnet, das das Kurventeil (1''), das das Profil (6') umfast, und dazwischen befindliches Material, beispielsweise ein Brückenbereich (31), aus einem Stuck aus dem selben Material, vorzugsweise Kunststoffmaterial, bestehen.

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1. Transporteur a maillons en chaine ayant au moins un troncon courbe (1, 1') comprenant une chaine (4) deplacee le long d'un chemin comprenant deux rails paralleles (2, 2', 9) de glissement, ladite chaine comprenant plusieurs maillons de chaine contigus et relies entre eux, chacun desdits maillons comprenant des Parties allongees pouvant glisser le long des rails de glissement et des parties (5) de liaison faisant saillie vers le bas et disposees dans une zone entre les rails (2, 2', 9) de glissement, les parties faisant saillie vers le bas comprenant des moyens opposes (17) en saillie et l'un desdits moyens (17) en saillie pouvant etre engage avec un profil (6) au moins dans le troncon courbe, caracterise en ce que lesdits moyens opposes (17) en saillie font face au plan central du maillon de chaine et en ce que ledit profil (6) est prevu entre les rails de glissement de maniere a permettre aux maillons de chaine d'etre enleves du rail par deplacement des maillons de chaine dans un sens s'eloignant du profil (6).
2. Transporteur a maillons de chaine selon la revendication 1, caracterise en ce que les moyens (17) en saillie presentent une surface inclinee (13) de glissement concue pour etre en contact avec le profil (6)
3. Transporteur a maillons de chaine selon la revendication 2, caracterise en ce que la surface inclinee (13) de glissement est sensiblement plane et presente une inclinaison vers le bas et vers l'interieur en direction du plan central du maillon de chaine.

4. Transporteur a maillons de chaine selon l'une quelconque des revendications 1-3, caracterise en ce que la zone comprise entre le profil (6) et une piece laterale (9) situee le plus a l'exterieur du troncon courbe (1, 1') est dimensionnee de facon a etabli un passage libre (15) suffisamment grand pour permettre aux maillons de chaine d'etre souleves librement du troncon courbe.
5. Transporteur a maillons de chaine selon la revendication 1, caracterise en ce que le profil (6) presente une saillie (14) avantageusement transversale sur le cote tourne vers l'exterieur dans le troncon courbe (1, 1').
6. Transporteur a maillons de chaine selon la revendication 5, caracterise en ce qu'une surface inclinee (12) de glissement, s'etendant longitudinalement, est prevue sur ou a la saillie (14) du profil (6).
7. Transporteur a maillons de chaine selon la revendication 6, caracterise en ce que la surface inclinee (12) est sensiblement plane et est inclinee vers l'interieur en direction du milieu du troncon courbe (1, 1').
8. Transporteur a maillons de chaine selon l'une quelconque des revendications 1-7, caracterise en ce que les rails (2, 2') de glissement sont disposes sur des pieces laterales paralleles (9) et en ce qu'une piece (8) de pontage est placee entre les pieces laterales qu'elle relie, laquelle piece de pontage comporte le profil (6) ; et dans lequel tous les elements sont formes integralement d'une seule piece de la meme matiere, avantageusement une matiere synthetique.
9. Transporteur a maillons de chaine selon la revendication 8, caracterise en ce que les pieces laterales (9) sont prolongees vers le bas et presentent des gorges ou chemins paralleles transversaux (10) sur les cotes tournes face a face pour recevoir un brin de retour des maillons de chaine.
10. Transporteur a maillons de chaine selon la revendication 7, caracterise en ce que la surface (12) est placee davantage a l'exterieur, dans le troncon de courbe, que l'axe central de la chaine.
11. Transporteur a maillons de chaine selon la revendication 1 et ayant un troncon de courbe (25) avec des disques (26, 27) qui sont montes tous deux de facon a pouvoir tourner sur une colonne (28) , comportant un element de retenue (30) qui est monte fixement entre les disques sur la colonne, lequel element de retenue (30) retient au moins une piece courbe (1'') qui constitue une partie du chemin de chaine le long de la peripherie de l'un des disques, caracterise en ce que la piece courbe (1'') comprend une piece laterale (9') dont la surface superieure (2') est la surface exterieure de glissement pour la chaine (4) ou l'un des disques constitue une surface (33) de support pour la chaine (4) et ou un profil (6') est situe le long du cote interieur de la piece laterale, a une certaine distance de la piece laterale (9') et dans un agencement lui permettant de venir en contact avec des parties (13), tournees vers l'interieur et faisant saillie vers le bas, sur les maillons (11) de chaine.
12. Transporteur a maillons de chaine selon la revendication 11, caracterise en ce que la piece courbe (1'') comprenant le profil (6') et de la matiere placee entre eux, par exemple une zone de pontage (31), sont formes integralement d'une seule piece de la meme matiere, avantageusement une matiere synthetique.